



Chestnut timber, Great Smokey Mountains, Western North Carolina.

DEATH OF THE AMERICAN CHESTNUT

BY **GEORGE H. HEPTING**

AS A BOY, on cold, blustery fall and winter nights, I well remember a shivering, old Italian standing on a street corner of downtown Brooklyn before his rickety sheet-metal oven-like contraption, yelling, "Hot **roasta** chestnuts! **Hotta** roast chestnuts!" I remember the popping and cracking noises as the old fellow took off the lid to give me a nickel's worth of the sweet, hot, delicious nuts. He always carefully measured them in a wooden or tin cup. The chestnut man was a familiar cold weather figure in New York in those days. He disappeared, because the American chestnut tree almost disappeared. They **tell** me he is back, but peddling the inferior European or Oriental chestnuts.

While chestnut trees meant chestnuts to us' city boys, they meant much more to the rural folks and **the country** in general. From southern New England to northern Georgia the average mountain cabin was made of chestnut logs and a chestnut shingle roof. Chestnut made fine fire wood. Fence posts, rails, and poles for rural telephone lines were made of this durable wood. The farmers' hogs were fattened on chestnuts, **and**, to no small degree, his children were also. Chestnuts made up a large part of the diet of wild turkeys, squirrels, and other wildlife.

The attractive grain of this fine wood made it ideal for interior uses such as paneling, trim, and furniture. Not only was baby's crib likely made of chestnut, but chances were, so was the old man's coffin. Chestnut has always been preferred for **buryin'** boxes. Heavy **leathers were** tanned almost exclusively with chestnut extract or blends and it took twenty huge plants to serve this one industry. Extract wood has been a major source **of** income to the Appalachian farmer. Among over 100 **commercial** hardwood species, chestnut made up over **one-fourth** of all hardwood timber cut for lumber in' the southern Appalachians. **In a nation** that **abounds** in versatile trees, the grand, stately American chestnut was easily the most versatile. Surely nothing serious could ever happen to this tough, durable, prolific species. Nature, however, decreed otherwise.

In 1904 Mr. H. W. **Merkel** of **the Bronx** Zoological Park in New York City noticed that the park's chestnut trees were dying. He studied several of these trees and found large patches of bark dying, apparently from some disease. He brought hi specimens to the attention of Dr. A. W. **Murrill** of the New York Botanical Garden. Dr. **Murrill** carefully examined them and in 1906 **published** his **conclusions** that the disease was caused **by** a fungus

There were summer spores and winter spores. The summer spores exuded in sticky masses from the bark cavities, like toothpaste from a tube, following warm summer rains.

new to science, which he named *Diaporthe parasitica*?

Other reports of what seemed to be the same trouble came in from the metropolitan area, and specimens were sent to the federal government's Bureau of Plant Industry. By May of 1907 reports showed that the disease was as far north as Poughkeepsie, New York, as far south as Trenton, New Jersey, and was generally spread over several New York, New Jersey, and Connecticut counties. At least two competent observers reported having seen a similar disturbance on Long Island as early as 1893, making it likely that the blight had a good start before Merkel's discovery.*

In 1909 Dr. Haven Metcalf, pathologist in charge of the government's new Laboratory of Forest Pathology, and a co-worker, Dr. J. F. Collins, wrote the first general bulletin on the blight, describing its history, cause, symptoms, and damage, and urging the states to take action to check the disease. Two years later they issued another bulletin specifically on control, in which they outlined a plan to stop the disease by eliminating it from nurseries, inspecting chestnut nursery stock, quarantines, the establishment of a blight-free zone along the edge of the main infected area, and the location and eradication of advance infections beyond this zone. They also recommended tree surgery to remove the areas of diseased bark, called cankers, from valuable ornamental trees.¹

Although government scientists recommended that a stiff fight be put up against the blight, they had reservations about chances of success. They knew the odds were against them. In a "do or die" spirit they stated in their control bulletin that "at present there is nothing in sight that promises even remotely to check its spread into new territory except the general adoption of the measures advocated in these pages." General adoption of these measures never took place, but as matters turned

out, neither these nor any other practicable means were destined to check the irresistible destruction of the disease.

By 1911 much had been learned about the causal organism of the blight. The fungus was found to distribute itself by means of microscopic seed-like spores, formed in cavities in the diseased bark. There were summer spores and winter spores. The summer spores exuded in sticky masses from the bark cavities, like toothpaste from a tube, following warm summer rains. These spores stuck to the feet of birds and insects and were readily carried long distances to infect other trees. The winter spores puffed from other bark cavities in tiny clouds and were carried by the wind to nearby trees. Both kinds of spores could infect a healthy tree so long as they were carried into a wound and could germinate there, sending their fine fungus threads into the inner bark, killing vital cells as they invaded. Once this bark-killing reached all the way around a tree or branch, death of all parts beyond followed, the action being similar to hacking around a tree with an ax.

Since chestnut trees normally have many wounds and punctures caused mostly by insects, woodpeckers, and natural bark cracks, the spores of the blight fungus, later rechristened *Endothia parasitica*, had no trouble finding access to start cankers. As though nature had not provided complete enough means for wholesale spread, man helped matters along by shipping diseased nursery stock around the country, carrying the blight fungus about on chestnut wood and even on clothes, shoes, and tools.

During the seven years after its discovery in 1904, the blight spread rapidly over New Jersey and parts of New York, Connecticut, Massachusetts, Rhode Island, Delaware, Virginia, and West Virginia. Plant scientists of the federal government, states, and universities were frantically studying the spectacular epidemic, amassing data, and coming to conflicting opinions on what the blight would eventually do. On one point all were in agreement — that millions of dollars of chestnut timber had, already been destroyed and that this valuable tree species, which made up a large proportion of the standing timber volume of the southern Appalachian region, was in serious danger.

The first concerted action toward controlling the blight was initiated by Pennsylvania in 1911. A Chestnut Blight Commission was authorized and was given the power to use all practical means to destroy the blight. They were given the right to enter onto any property regardless of ownership and to

*W. A. Murrill, "A Serious Chestnut Disease," *Journal of the New York Botanical Garden* 7 (1906): 143-153, 203-211.

¹Pennsylvania, Chestnut Tree Blight Commission, *The Chestnut Blight Disease, Bulletin No. 1* (Harrisburg: C. E. Aughinbaugh, Printer to the State of Pennsylvania, 1912). p. 1.

²U.S., Department of Agriculture, Bureau of Plant Industry, *The Present Status of the Chestnut Bark Disease*, by Haven Metcalf and J. Franklin Collins, *Bulletin No. 141* (Washington, D.C.: Government Printing Office, 1909); *The Control of the Chestnut Bark Disease*, by Metcalf and Collins, [USDA] *Farmer's Bulletin No. 467* (GPO, 1911).

cooperate with the owners in the removal of diseased or threatened trees, and were even given the power to force the hand of recalcitrant individuals regarding the removal of trees. A quarantine on the movement of chestnut products from diseased to disease-free zones was authorized. They were granted \$275,000 by the state legislature to control the blight, a large sum in those days.'

In 1912 this commission held a conference to discuss its program. All scientists and others who had any knowledge to contribute concerning the blight were invited from a dozen states, the federal government, and Canada. The commission wisely published these and subsequent proceedings, and the yellowed pages of these old documents, including the stenographic record of the arguments and discussions that took place between scientists with divergent views on the cause and control of the blight., make interesting reading now that the almost complete destruction of the chestnut by the blight is an accomplished fact.

The Pennsylvania conference was called by Governor Tener at Harrisburg, on February 20, 1912. He opened the proceedings with a summary of the situation to date. One paragraph of his address in particular sounded the keynote of the conference.

Two great facts to be borne in mind are, first, that the plague is with us and it must be reckoned with; and second, that harmonious action and complete cooperation among all the interests involved, as well as the governments of the various states, can and will be the only means of checking this disease, if it can be checked. We are not so much concerned with its origin as we are with its presence and effects. While its botanical history and pathology are of importance, the real thing is preparedness to repel the invader, using every means known to science and practical experience.⁶

Many scientists, state officials, lumbermen, and others presented data and opinions on whether and how the blight could be controlled. It is interesting to review the positions taken by some of these men. Early in the program, Dr. F. C. Stewart of the New York Agricultural Experiment Station gave a paper in which he stated that in view of the tremendous headway the blight had made and the effectiveness of the natural means of spread, the blight could not be controlled. His opening remarks were as follows:

My views are so much at variance with what I conceive to be the sentiment of this Conference that I hesitated somewhat to present them. I feel like one

throwing water on a fire which his friends are diligently striving to kindle. But a sense of my duty to the public, and also myself, impels me to proceed.⁶

Stewart's paper was a scholarly analysis of the impracticability of stopping this disease, with the causal fungus on millions of trees spewing billions of spores over the countryside. He concluded:

It is better to attempt, nothing than to waste a large amount of public money on a method of control which there is every reason to believe cannot succeed altogether... What will be the future course of the disease can only be conjectured⁴ but it can be safely predicted that nothing that man can now do will materially affect its course.⁷

No one then knew how right he was, but in place of the loud applause that followed the talks of the action group, Stewart's talk was followed by a great silence.

Only a few of those at the conference agreed with Stewart that the plan to stop the blight was doomed to failure. These included Drs. Mel Cook of New Jersey, Westley Webb of Delaware, W. A. Murrill of New York, and G. P. Clinton of Connecticut.

Cook said, "I find . . . that those who have looked into the situation most carefully are inclined to believe that, so far as the State [New Jersey] is concerned, the situation is practically hopeless."⁸

Webb flatly stated that "The only way to destroy the disease in Delaware . . . is to destroy every chestnut tree and clean it up."⁹

Clinton was against eradication, but his reasons were faulty. He was one of the ablest of our early plant pathologists, and his published views on the chestnut blight proved to his everlasting embarrassment in later years. Clinton predicted (1) that the blight was not from the Orient; (2) that the fungus was a native American species; (3) that it was a previously described species; (4) that its rise was related to weather conditions; (5) that it was impossible to eradicate by cutting it out; and (6) that it would decline naturally. He proved to be wrong on all counts but number 5.¹⁰

Harvard's great botanist, W. G. Farlow, erroneously concluded that the blight fungus was a species long known in Europe that roosted on various tree species there, doing practically no damage.¹¹

Lined up against the handful of anti-eradicationists was the great weight of the conference, including the federal scientists, the Pennsylvania group that was behind the action program, and many other competent individuals and organizations. Behind them they had the force of public

⁶Pennsylvania, *Chestnut Tree Blight Disease*.

⁷Pennsylvania, *The Conference Called by the Governor of Pennsylvania to Consider Ways and Means for Preventing the Spread of the Chestnut Bark Disease, 20 and 21 February 1912*, Chamber of, the House of Representatives, *Stenographic Report of Proceedings of the Conference* (Harrisburg: C. E. Aughinbaugh, Printer to the State of Pennsylvania, 1912), p. 17.

⁸*Ibid.*, p. 40.

⁹*Ibid.*, p. 45.

¹⁰*Ibid.*, p. 23.

¹¹*Ibid.*, p. 22.

¹²*Ibid.*, p. 76.

¹³*Ibid.*, pp. 70-75.

opinion that wanted something done. Dr. J. W. Harshberger 'of the University of Pennsylvania stated:

Professor Stewart, in his communication this afternoon, discouraged the work which is being done by the Pennsylvania Chestnut Blight Commission in the removal of trees along the outposts of the disease. I would like to present my view of the problem, because I think it is largely a question of the attitude of the State of Pennsylvania toward these larger questions of conservation which have agitated the country for the past few years. Pennsylvania is the Keystone State. . . In the future, when we look back on the history of the conservation movement in the United States, this movement in Pennsylvania will be hdd up as an example of a patriotic movement of the entire people in an attempt to prevent the destruction of our native forests, which are going all too fast. So this movement, it seems to me from my standpoint, is one of the most commendable things which has been done by any state in recent years and, even if no direct result is reached, we can point with pride to the attempt which has been made to check the disease.¹²

The Honorable I. C. Williams, Deputy Commissioner of Forestry in Pennsylvania, castigated Stewart.

Some of the speakers this afternoon seem to be utterly appalled at the fact that Pennsylvania has thrown \$275,000 into a **rathole** The mere fact that somebody believes that something cannot be done is going to have mighty little weight in the work of this Commission' [applause]. We do not care a rap what **someone's** belief is We want to go hand in hand with everybody who can **lend** an iota of strength to this work; but we do not care to join hands with those who see simply gloom and failure, and are unwilling to make any decent effort to determine whether or **not** a thing **can** or cannot be done. . . . If it is going to turn upon someone's opinion, then I would like this meeting to believe that probably one **man's** opinion is as good as **another's**.¹³

Mr. R. A. Pearson, a former Commissioner of Agriculture for New York State, was chairman of the conference. He waxed emotional over the issue.

It has been suggested that we should do nothing to counteract the ravages of the chestnut tree disease, because we are not fully informed as to how to proceed. That is un-American. It is not the spirit of the Keystone State, nor the Empire State, nor the New England States, nor the many other great states that are represented here, to sit down **and** do nothing, when catastrophes are upon us. It has been suggested that we should wait patiently until the scientists have succeeded in working out these questions in **all** their minutae; that thus we may be able to accomplish our **results** more quickly. **But that is** not the way that great questions are solved. **If we** had waited until the application of steam should be thoroughly understood, we would **be still waiting for our great trains and steamboats**, which are the marvel of the age [applause].¹⁴

It is difficult now to see where flag-waving and the glories of the Keystone State of Pennsylvania had any place in sober scientific calculations on the wisdom of spending huge sums of money to try to stop, with ax and saw, a tree blight spread over thousands of square miles and perfectly equipped to go the rest of the distance. The crusading spirit pervaded the conference, as though the State of Pennsylvania were single-handedly going out to fight an army to preserve the Union, instead of a scientific battle against an insidious parasite, requiring weapons that simply were not in man's arsenal. Wishful thinking took the place of reason, bolstered by the commendable spirit of doing something.

Mark A. Carleton, the man who sought out and brought the hardy Kubanka winter wheat to this country from Russia when the stem rust disease was devastating our wheat lands, and whose accomplishments have been dramatically portrayed by Paul DeKruif in his *Hunger Fighters*, was chosen to manage the Pennsylvania campaign against the blight. He, too, was optimistic. After a year's work trying to hold the disease in the eastern part of the state by scouting for advance infections, cutting and burning trees, conducting studies of various sorts, treating individual trees to try to save them, promoting the utilization of dead and dying trees, and giving demonstrations and lectures, Carleton concluded:

Given a sufficient appropriation for the next two years, which should be much more than hertofore appropriated, I am still **confident, as stated in the recent summary of the results** for the Governor, that at the end of **two more years we shall have** the chestnut blight disease practically under **control**.¹⁵

The Pennsylvania legislature came through nicely. Altogether over \$500,000 was spent in the grand attempt in that state, but the blight was neither stopped nor markedly impeded.

In 1913 a federal plant explorer found the chestnut blight fungus in its native haunts in China, . . . where it lived unobtrusively as a harmless member of the fungus flora on occasional twigs of the Oriental chestnut species. The chain of historical events was now complete. The fungus had been imported into this country undoubtedly on nursery stock of Asiatic chestnuts that were being planted widely in the United States. It found our chestnut a much more congenial host than the Asiatics and proceeded to go on a roman holiday at our expense.

In the final report of the Pennsylvania Commission in 1914, optimism had vanished. Transmitting

¹²Ibid., pp. 106-107.

¹³Ibid., pp. 108-109.

¹⁴Ibid., p. 20.

¹⁵Pennsylvania, Chestnut Tree Blight Commission, *Report of the Pennsylvania Chestnut Tree Blight Commission July 1 to December 31, 1912* (Harrisburg: C. E. Aughinbaugh, Printer to the State of Pennsylvania, 1913). p. 18.

the final report in his letter to the governor, the commission chairman stated:

In conclusion, it seems necessary to call sharp attention to the real lesson to be learned from the chestnut blight epidemic — viz: the necessity of more scientific research upon problems of this character; to be undertaken early enough to be of some value in comprehending, if not controlling, the situation.¹⁶

Stewart was vindicated.

In his final report Carleton painted a rosy picture of the accomplishments of his organization. No doubt the program delayed the advance of the blight, but not enough to be noticeable on a map showing its spread north, west, and south from 1910 to 1920.¹⁷

The let's-go-get-'em" gentlemen were strangely silent in the final report. Williams confined himself to giving a history of the blight to the beginning of the campaign, adding that after all they never sought to exterminate the disease but only to control it. There was no message from Pearson or Barshberger. The blight was not controllable by any means available then or now, and tilting with windmills or butting heads against stone walls

would not have turned the tide in the face of, the clear evidence available in 1911. Pennsylvania made a splendid heroic effort, but the weapons of the enemy were as atomic bombs compared to the toy swords of men trying to stop spread of the disease.

The blight swept southward and westward into the vast forests of the southern Appalachian mountains. By 1920 one-half of the chestnut trees were blight-killed as far south as central Maryland and west to central Pennsylvania. By 1930 half were dead from northern North Carolina to Ohio. Today not an acre of American chestnuts is blight-free, and of the original stand only a few dying trees remain along the southern edge of the chestnut range and in the high reaches of the Great Smokies. The loss must be measured in hundreds of millions of dollars.

Early in the battle it was observed that the Chinese and Japanese chestnut species planted in this country did not succumb to the blight. When other methods of combatting the disease failed, the Department of Agriculture decided to try to capitalize on the resistance of the Asiatic varieties by planting them widely in this country and by crossing them with the American species. The aim of their breeding experiments has been to produce trees with the desirable tree form and nut flavor of the American tree, and the blight-resistance and larger nut size of the Japanese and Chinese trees.

In the late 1920s the Department of Agriculture sent another plant explorer, R. Kent Beattie, to the Orient to search out sources of nuts from a wide

¹⁶Pennsylvania, Chestnut Tree Blight Commission, *Final Report of the Pennsylvania Chestnut Tree Blight Commission, January 1 to December 15, 1913* (Harrisburg: Wm. Stanley Ray, State Printer, 1914), p. 12.

¹⁷Russell B. Clapper and G. F. Gravatt, "The American Chestnut: Its Past, Present, and Future," *Southern Lumberman* 55 (December 15, 1943), n.p.



U.S. Forest Service



Blight-killed chestnut tree in North Carolina. Photo by George L. Snowden.

variety of types of the Asiatic species. He shipped back bushels and arranged for large additional quantities to be *sent* after he returned to this country. Seedlings were raised, mostly at the government's horticultural station at Glenn Dale, Maryland, and those were distributed widely for trial. Some strains of the resulting blight-resistant trees produced straight trunks and good nuts. Hybrids have been developed that promise to be better than the true Asiatic species. Unfortunately all these chestnuts require fertile soil of good tilth to succeed. This sharply limits their usefulness in reforestation.

Most of the land formerly occupied by 'our chestnut is now taken over by young growth of oaks, maples, poplars, ashes, and other species that were associated with the chestnut. There is little room in the hardwood forest itself for any kind of tree to

be planted in quantity. The open land that **needs** planting in the East is seldom fertile, and **consists** largely of abandoned submarginal farms with **worn-out** and eroded soil. Here where our large **plantable** acreage lies, the new chestnuts will not thrive. **Even** if **they** did grow well on such sites, there is serious doubt over the financial wisdom of planting **them** as compared to pine or certain other species. If the planted Orientals were to grow at the fair rate of a cord per acre per year, it would take 100,000 acres of **pure** chestnut to provide the requirements of the eleven tannin acid-wood plants still operating during World War II if only the current growth were used each year. Thus it becomes fantastic to imagine how enough of these rich-soil-demanding trees could be practicably planted to preserve the chestnut extract industry. There is no longer a chestnut tannin industry, the abundant black locust makes a more durable fence post than chestnut, **and** the creosoted pine pole would never be replaced with chestnut. Shingles now are seldom made of wood, and the old familiar chestnut rail fence has given way to barbed wire. Even the squirrels, which many thought would be drastically depleted by the ^{loss} of their favorite food, seem to be quite happy eating acorns and other seeds. It looks as though we are getting along quite well without the chestnut.

The chestnut blight brought to the surface a large crop of quacks, **crackpots**, charlatans, and bumbling but sincere "**mean-wellers**." During the early days of the blight, hundreds of so-called **tree** surgeons roamed the towns and cities telling people that the blight would get their trees if they didn't have them treated. The worried owners, not wanting to lose their trees, would usually have the work done. The "**surgeons**" would then spread **some** secret substance over the soil, or bore a hole in the tree and inject a colored solution, or try to cut out the cankers. They would collect a generous fee and go on to the next victim. The trees invariably died.

The records show a long list of fantastic claims and ridiculous remedies. The blight was said to be due to **burning** the woods or not burning the woods; to too little or too much lime; to bugs, the weather, the moon, and various other strange agencies. Not a single remedy has checked the blight except complete aseptic surgical removal of infected tissue, and this treatment is only a palliative since a tree will become reinfected.

The question of whether or not the chestnut **will** come back has intrigued tree lovers and forest scientists since its fate became obvious. The fervent hope that the blight will wane and the tree will wax has prejudiced much thought on the subject. Observers who feel that the chestnut is beginning to resist the blight are mostly amateur **na** turalists, woods enthusiasts, a few professional foresters, and a good many dilettante pseudo-scientists. Probably no pathologist openly holds this view today.

**The chestnut blight thus far
perhaps represents plant
pathology's biggest failure.**

Let us look at evidence that must guide our prognoses. The chestnut reproduces mostly by sprouts that arise from the stumps of cut or killed trees. The blight does not kill the roots, so sprouting is prolific from the bases of blighted trees. To a lesser extent reproduction is by seedlings from nuts that fall to the ground or are distributed or buried by squirrels. When the disease was at its peak, sprouts rarely grew larger than an inch or two in diameter before they were killed. The same stump may repeatedly send up sprouts. Observers in northeastern areas where the blight has worked longest tell us that the sprouts are now getting much larger. Often they grow old enough to produce nuts before succumbing. Seedlings three or more inches through have been reported. Sprouts grow larger, before dying now for two main reasons. First, there are many fewer spores distributed now that the great hulk of the chestnuts are gone; hence trees escape infection longer. Secondly, in the early days of chestnut abundance no one noticed occasional large blight-free sprouts. Now these are avidly sought. The hopefuls show us some cankers: with large healthy callus at the margins, indicating a tree's attempts at healing. Many such cases of the tree putting up a strong fight for life for a few years were reported years ago also.

My view of the chestnut's future is *not* optimistic for several reasons. (1) Sprouts from blight-killed trees have all of the genetic characteristics of the parent tree; therefore, if the parent tree were blight-susceptible, the sprout can be expected to be equally susceptible. Thus the vast crops of sprouts are doomed. (2) Thousands of reports to the U. S. Department of Agriculture of blight resistance have not yielded a single case of blight immunity in the American species. (3) The theory of the development of resistance through generations of natural selection has not been adequately tested because only one generation of chestnut trees has developed from seed since the blight first struck. (4) There is no evidence that the virulence of the fungus has decreased. Recent tests have shown that the fungus now in Massachusetts where the blight has been active for almost fifty years is just as lethal as the fungus in the deep South where its activity is much more recent.

Some chestnuts seem resistant for a time. They must develop bark cracks or punctures for the spores to infect, and viable spores must reach the openings. When these two conditions are satisfied, the tree will usually become cankered. If it repeatedly throws off the fungus, it is either a most remarkable American chestnut, or, more likely, is

one of the Asiatic species. We all hope that the chestnut will return, but it is only a hope. G. F. Gravatt and Russell Clapper, two of our most indefatigable chestnut blight workers, state in a 1943 article, that "on the basis of past experience and in the light of present knowledge we can expect little change in the status of the American chestnut."

The chestnut blight thus far perhaps represents plant pathology's biggest failure. However, the money spent on the blight research has not been wasted. Not only have we learned much to aid us in delaying the entrance of other tree diseases from foreign lands and in combatting them if they get here, but our studies on the utilization of blight-killed wood enabled us to state with assurance that this wood would be usable for tannin extraction and paper pulp up to thirty years after the trees were dead. This extremely valuable prediction has been borne out and has enabled the extract and pulp industries to plan their operations over a much longer period than believed possible years ago. Importation of Asiatic species and experiments in hybridization promise to make chestnut groves again a reality for those who want them.

The great chestnut forests will not be reproduced by planting. The mountains will again be clothed with Chestnut only if the blight abates or resistance develops. While both are possibilities, there is no sound evidence that either is taking place.

The story of the disease that destroyed the glorious American chestnut tree is a plant tragedy second to none and symbolizes the need for man's unceasing struggle against forest pests. Decades ago a blight of potatoes brought famine to Ireland, and many diseases continue to wreak havoc on various crops, but the chestnut blight stands as the only disease known that has almost completely destroyed a plant species. Although a few heavily infected diehards still survive, and although occasional seedlings come up and recurring groups of sprouts continue to arise from the stumps of blight-killed trees only to be blighted, again, the stand of American chestnut is gone. The blight has shown that the balance of nature cannot be depended upon to arrest tree diseases before calamitous and irreparable damage is done.

In serving this object lesson to the world, the fungus *Endothia parasitica* focused attention on the urgency of forest disease research. It was the reason for the first major state and federal appropriations for studying tree diseases. Since the fungus came from the Orient, it showed that a sword always hangs over us in the form of plant diseases innocuous in other lands which may prove highly damaging if introduced to our crop plants. It also showed the highly expensive folly of trying to prevent the spread of a forest disease organism once it developed a widespread foothold in this country. □